* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to an optical disk unit and optical disk media, and Especially, a disk unit for information machines and equipment, It is related with the optical disk media which record information optically in two different storage density formats by videodisc player, an audio disk player, etc., and are used for the optical disk unit and it which are reproduced.
[0002]
[Description of the Prior Art]There is a compact disc (CD) standard as a standard of the optical disk unit which has spread most now. There are a standard of CD-ROM (read only memory) using the standard of CD which is the optical disk media for recording a sound in digital one, and CD to the read-only memory of a computer, a standard of CD-R (trade name), a standard of CD-RW which are added-a postscript type CD, etc. in this CD standard.
[0003]In response to the needs to use it as media for using optical disk media as media supplied of movie software, or on the other hand treating an animation on a personal computer, the DVD (digital versatile disk) standard is examined briskly in recent years. The standard of DVD-VIDEO, DVD-ROM, DVD-R, DVD-RAM, etc. is one of this DVD standard. Hereafter, it explains taking the case of DVD-RAM.
[0004]Drawing 4 (A) and (B) shows the sectional view of an example of the structure of optical disk media and the expanded sectional view of an important section which are used with the conventional optical disk unit. The 1st 0.6-mm-thick disk 101 with which the optical disk media 100 which are DVD-RAMs consist of the recording surface 101a and the base material 101b in drawing 4 (A) and (B), Similarly it is constituted from the 1st disk 101, the 2nd disk 102 of the same path, and the glue line 103 for pasting together the mutual opposed face of these 1st and 2nd disks 101 and 102 by 0.6 mm in thickness. The whole thickness is set as the 1.2 same mm as CD.
[0005]Drawing 5 shows the lineblock diagram of an example of the important section of the conventional optical disk unit. The laser beam emitted from the 1st optical system 30 that contains a semiconductor laser and a photodetector among the figure, After a parallel beam is used with the collimating lens which is not illustrated, the wavelength selection prism 22 and the object lens 21 are penetrated one by one, and on the recording surface 101a of the optical disk media 100, focal coincidence is carried out, it is condensed, and a spot about 0.9 micrometer in diameter is formed. With the above-mentioned outward trip, the light reflected by this recording surface 101a penetrates the object lens 21, the wavelength selection prism 22, and a

collimating lens (not shown) for reverse, enters into the 1st optical system 30, and is received with the photodetector within the 1st optical system 30.

[0006]As tracking-error detection system used for an optical disk unit, the push pull method with easier composition than before is used widely. This push pull method is a method which detects a track error signal by taking out the optical beam reflected in the guide rail established in the signal surface of optical disk media as output difference of the photo detector of 2 division symmetrically arranged to a track center.

[0007]Drawing 6 shows the lineblock diagram of an example of the above-mentioned track error signal detector circuit in the conventional optical disk unit. In the figure, the photodetector 31 for DVD within the 1st optical system 30 constitutes the quadrisection photodetector which consists of the four photo detectors 31a-31d.

The spot by the reflected light beam from the recording surface 101a of the optical disk media 100 is formed in the acceptance surface, photoelectric conversion is carried out by the four photo detectors 31a-31d, respectively, and it is changed into the electrical signal of the level according to those acceptance surface products.

[0008]Each electrical signal outputted from the photo detectors 31a and 31b is added with the summing amplifier 51, and each electrical signal outputted from the photo detectors 31c and 31d is added with the summing amplifier 52. Each summed signal taken out from these summing amplifiers 51 and 52 is supplied to the subtraction amplifier 53, is taken out as a track error signal which shows the output difference of the photo detector of 2 division which was subtracted here and has been symmetrically arranged to a track center, and is outputted to the below-mentioned operation amplifier 65.

[0009]Being obtained is well known when a focus error signal and a regenerative RF signal also calculate suitably each above-mentioned photo detectors [31a-31d] output power signal. The 2nd optical system 40 in drawing 5 is used for record or reproduction of a CD medium.

[0010]

[Problem(s) to be Solved by the Invention]However, in the above-mentioned conventional optical disk unit. Since track error detection is carried out using the push pull method, if there is a relative angle gap (called a tilt) of movement (a gap of an optic axis arises) of the object lens 21 of an optical pickup, and the optical disk media 100 and the object lens 21, direct current offset will occur in a track error signal.

[0011]If this direct current offset occurs, even if a track error signal is 0, it will be said that light beam spot does not exist in the center of a track, and the fault that recorded information on optical disk media cannot be read correctly will arise. Especially in the optical disk media 100 by which densification was carried out, a track pitch and the width of recording track are set up very small, and need to make control precision, such as tracking, highly precise.

[0012]Then, in order to make control precision highly precise in the conventional optical disk unit, As shown in drawing 6, the lens position sensor 61 and the tilt sensor 62 are formed, the movement magnitude of the object lens 21 and the tilt amount of the optical disk media 100 are measured, and means to apply the quantity to a servo circuit and to reduce direct current offset are taken.

[0013]Namely, in drawing 6 the detecting signal of the lens position sensor 61, The operation amplifier 63 is supplied, and it is considered as the signal according to the movement magnitude of the object lens 21, and, on the other hand, the detecting signal of the tilt sensor 62, The operation amplifier 64 is supplied, it is

considered as the signal according to the tilt amount of the optical disk media 100, the operation amplifier 65 is supplied, respectively, and predetermined data processing is performed to the track error signal taken out from the subtraction amplifier 53. Thereby, the track error signal with which direct current offset was reduced is taken out from the operation amplifier 65.

[0014]However, in order to generate the track error signal with which direct current offset was reduced in the above-mentioned conventional optical disk unit, As shown in drawing 6, it is necessary to mount the lens position sensor 61 and the tilt sensor 62 in an optical pickup. Problems, such as a cost hike by working manhour increase for this to adjust enlargement, a weight increment, and by extension, the adverse effect and the sensors 61 and 62 to an access speed of an optical pickup, are caused.

[0015]An object of this invention is to provide the optical disk unit and optical disk media which generate a track error signal by the push pull method, and can carry out track flattery of the light spot with high precision, without having been made in view of the above point and using a lens position sensor and a tilt sensor.

[0016]Other purposes of this invention are to provide both the optical disc of a CD standard, and the high density optical disk of the standard of several times as high-density DVD-RAM as this etc. with the optical disk unit and optical disk media which can carry out track flattery of the light spot with high precision.

[0017]

[Means for Solving the Problem]In order to attain the above-mentioned purpose, an optical disk unit of this invention, Record of optical disk media of the 1st standard or the 1st optical system for reproduction, and record of optical disk media of the 2nd standard or the 2nd optical system for reproduction, A spot by the 1st laser beam from the 1st optical system is formed in record or a reproduction side of optical disk media, And lead the catoptric light to the 1st photodetector of the 1st optical system, and simultaneously with this. Optical-path means forming which forms a spot by the 2nd laser beam from the 2nd optical system in a uniform reflector established in a different focal position from record or a reproduction side of optical disk media, and leads the catoptric light to the 2nd photodetector of the 2nd optical system, A track error signal is generated based on an output signal of the 1st photodetector, and an output signal of the 2nd photodetector, It has a tracking control means which carries out tracking of the spot by the 1st laser beam, and optical disk media are considered as composition which performs record or reproduction of information as optical disk media of the 1st standard.

[0018]In this invention, record or reproduction of information is faced carrying out to record or a reproduction side of optical disk media using the 1st laser beam, Not only in an output signal of the 1st photodetector that receives catoptric light from record or a reproduction side of optical disk media of the 1st laser beam, He is trying to acquire a track error signal using an output signal of the 2nd photodetector that receives catoptric light from a reflector of optical disk media of the 2nd laser beam, Since a track error signal acquired from the 2nd above-mentioned photodetector is a signal according to an optic-axis gap with an object lens in optical-path means forming, or a relative angle gap with an object lens and optical disk media, Direct current offset which originates in an above-mentioned optic-axis gap and an angle gap from a track error signal can be amended.

[0019]The 1st above-mentioned laser beam and 2nd laser beam differ in wavelength mutually, and here this invention, It is characterized by optical-path means forming which is formed in a uniform reflector which formed a spot by the 1st laser beam in record or a reproduction side of optical disk media and, in which a spot by the 2nd laser beam was provided by optical disk media and which can be set without accumulating

and being alike comprising the following.
Object lens.
Multiplex the 1st laser beam emitted from the 1st optical system, and the 2nd laser beam emitted from the 2nd optical system, and it enters into an object lens, Wavelength selection prism with which separates spectrally catoptric light from optical disk media which penetrated an object lens, catoptric light of the same wavelength as the 1st laser beam enters into the 1st optical system, and catoptric light of the same wavelength as the 2nd laser beam enters into the 2nd optical system.
Thereby, an object lens can be shared in the 1st and 2nd optical systems.
[0020]This invention is characterized by that an optical disk unit of this invention comprises the following again.
1st means by which the above-mentioned tracking control means generates record of optical disk media, or a track error signal for reproduction sides from an output signal of the 1st photodetector.
2nd means to generate a track error signal for reflectors with uniform optical disk media from an output signal of the 2nd photodetector.
A subtraction means which subtracts an output track error signal of the 1st and 2nd means, respectively, and is outputted as a new track error signal record of optical disk media, or for reproduction sides.

[0021]This invention is characterized by optical disk media comprising the following, in order to attain the above-mentioned purpose.
The 1st disk that has the characteristic which record or a playback side is formed in a focal position where record of optical disk media of the 1st standard or the 1st optical beam of the 1st wavelength for playback is irradiated, and penetrates record of optical disk media of the 2nd standard, or at least a part of 2nd optical beam of the 2nd wavelength for playback.
The 2nd disk that has a uniform reflector in a focal position where the 2nd optical beam of the 2nd wavelength is irradiated.
A glue line which pastes an opposed face of the 1st and 2nd disks together, and is unified.

[0022]The 1st above-mentioned disk is the structure where record or a playback side which has a guide rail for tracking control was formed on the 1st transparent base material here, and the 2nd above-mentioned disk, Are the structure where a uniform reflector was formed on the 2nd transparent base material, and the above-mentioned glue line, As record or a playback side of the 1st disk is located in the same focal position as record or a playback side of optical disk media of the 1st standard and a reflector is located in the same focal position as record or a playback side of optical disk media of the 2nd standard, the 1st record or playback side, and 2nd base material of a disk are pasted together.
[0023]By using optical disk media of this this invention, an expected operation effect mentioned above with an optical disk unit of this invention can be obtained.
[0024]
[Embodiment of the Invention]Next, an embodiment of the invention is described with Drawings. Drawing 1 shows the lineblock diagram of the 1 embodiment of the important section of this invention optical disk unit, and, as for the sectional view of the 1 embodiment of this invention optical disk media and the expanded sectional view of an important section, and drawing 3, drawing 2 shows the lineblock diagram of the 1

embodiment of other important sections of this invention optical disk unit.

[0025]Also to which optical disk media of a CD standard and a DVD standard, this embodiment is an optical disk unit which can record or reproduce information, and carries two kinds of laser light sources. The Reason has an indispensable laser beam whose wavelength is about 780 nm on the characteristic of a medium to the record over the optical disk media of a CD standard, and reproduction, and is because the laser beam whose wavelength is about 650 nm is used for the record over the optical disk media of a DVD standard, and reproduction.

[0026]As shown in drawing 1, the optical pickup of the optical disk unit of this embodiment has the object lens 21, the wavelength selection prism 22, the 1st optical system 30, and the 2nd optical system 40. The 1st optical system 30 is used for record of the optical disk media of a DVD standard, and reproduction including the photodetector 31 of the 1st laser light source and drawing 3 which emits the laser beam whose wavelength is about 650 nm. The 2nd optical system 40 is used for record of the optical disk media of a CD standard, and reproduction including the photodetector 41 of the 2nd laser light source and drawing 3 which emits the laser beam whose wavelength is about 780 nm. Each optic axis of the 1st optical system 30 and the 2nd optical system 40 is adjusted so that it may be abbreviated-in agreement with the optical axis center of the object lens 21.

[0027]Next, the optical disk media of this embodiment are explained with drawing 2. The 1st disk 11 with a thickness of 0.6 mm which consists of record or the playback side (it abbreviates to a "recording surface" hereafter) 11a, and the transparent base material 11b as the optical disk media 10 are shown in drawing 2 (A) and (B), It comprises the glue line 13 which is pasting together the base material 12b of the 2nd disk 12 with a thickness of 0.6 mm which consists of the uniform reflector (mirror plane) 12a, the transparent base material 12b, and the protective film 12c, and the recording surface 11a of these 1st disks 11 and the 2nd disk 12.

[0028]The thickness of the glue line 13 is several 10 micrometers, for example, and the recording surface 11a and the mirror plane 12a become almost parallel. The guide rail (groove part) for tracking control is established in the recording surface 11a. Generally this recording surface 11a comprises multilayered films, such as a Te-germanium-Ox system, it is before and after record, and changes reflectance, and penetrates a part of irradiated laser beam.

[0029]By devising a presentation and thickness of record film, it is also possible to change the transmissivity by wavelength and it has especially here composition which raised the transmissivity to an about 780-nm laser beam. The mirror plane 12a is arranged at the same position as the recording surface of the optical disk media of a CD standard. According to this embodiment, the optical disk media of the DVD standard of this structure are used.

[0030]Next, operation of this embodiment is explained with drawing 1 thru/or drawing 3. The 1st laser beam that was emitted from the laser light source within the 1st optical system 30 of drawing 1 and whose wavelength is abbreviated 650nm, After using a parallel beam with the collimating lens which is not illustrated and penetrating the wavelength selection prism 22, focal coincidence is carried out on the recording surface 11a of the optical disk media 10 with the object lens 21 of NA(numerical aperture)0.6, it is condensed, and a spot about 0.9 micrometer in diameter is formed.

[0031]With the above-mentioned outward trip, the light reflected by this recording surface 11a penetrates the object lens 21, the wavelength selection prism 22, and a collimating lens (not shown) for reverse, enters into

the 1st optical system 30, and is received as the beam spot by the photodetector 31 within the 1st optical system 30. The information on which it is based on a DVD standard to the recording surface 11a of the optical disk media 10 according to the 1st optical system 30, and information is recorded or recorded by this is reproduced.

[0032]On the other hand, originally in this embodiment, the 2nd optical system 40 for the optical disk media of a CD standard is also simultaneously used as mentioned above to the optical disk media 10 using the 1st optical system 30 at the time under Information Storage Division of a DVD standard, or reproduction motion. The 2nd laser beam that was emitted from the laser light source within the 2nd optical system 40 and whose wavelength is abbreviated 780nm, After light flux was extracted by the aperture limit means which a parallel beam is used with the collimating lens which is not illustrated, and also is not illustrated, The recording surface 11a of the optical disk media 10 is penetrated with the object lens 21, and near the mirror surface part 12a, focal coincidence is carried out, it is condensed [90 degrees reflects by the wavelength selection prism 22, and], and a spot about 1.4 micrometers in diameter is formed. NA of the 2nd optical system 40 is designed by abbreviation 0.45 with said aperture limit means and the object lens 21.

[0033]The light reflected in the above-mentioned mirror plane 12a follows an optical path for reverse with the above-mentioned outward trip, It enters into the 2nd optical system 40 through the object lens 21, the wavelength selection prism 22, an aperture limit means, and a collimating lens (neither is illustrated), and light is received as the beam spot by the photodetector 41 within the 2nd optical system 40.

[0034]Each output signal of the above-mentioned photodetector 31 and the photodetector 41 is used for the tracking-error circuit etc. which are shown in drawing 3. As shown in drawing 3, the photodetector 31 constitutes the quadrisection photodetector which consists of the four photo detectors 31a-31d, The spot A by the reflected light beam from the recording surface 11a of the optical disk media 10 is formed in the acceptance surface, carries out photoelectric conversion by the four photo detectors 31a-31d, respectively, and outputs the electrical signal of the level according to those acceptance surface products.

[0035]Each electrical signal outputted from the photo detectors 31a and 31b is added with the summing amplifier 51, and each electrical signal outputted from the photo detectors 31c and 31d is added with the summing amplifier 52. Each summed signal taken out from these summing amplifiers 51 and 52 is supplied to the subtraction amplifier 53, is subtracted here, and is taken out as a track error signal of the 1st optical system. Although the track error signal of this 1st optical system expresses the gap with the beam spot on the recording surface 11a, and the center of a groove part, or the gap with the beam spot and the center of a land, They are the optic-axis gap and the optical disk media 10 by object lens 21 movement of an optical pickup, and a signal also containing the direct current offset by relative angle gap of the object lens 21.

[0036]On the other hand, the photodetector 41 constitutes the quadrisection photodetector which consists of the four photo detectors 41a-41d, The spot B by the reflected light beam from the mirror plane 12a of the optical disk media 10 is formed in the acceptance surface, carries out photoelectric conversion by the four photo detectors 41a-41d, respectively, and outputs the electrical signal of the level according to those acceptance surface products.

[0037]Each electrical signal outputted from the photo detectors 41a and 41b is added with the summing amplifier 54, and each electrical signal outputted from the photo detectors 41c and 41d is added with the summing amplifier 55. Each summed signal taken out from these summing amplifiers 54 and 55 is supplied to the subtraction amplifier 56, is subtracted here, and is taken out as a track error signal of the 2nd optical

system. The track error signal of this 2nd optical system is the catoptric light from the mirror plane 12a without a land or a groove part (there is no diffracted light from a land or a groove part), and is a signal only according to an aforementioned optic-axis gap and angle gap.

[0038]The track error signal of the 1st optical system taken out from the subtraction amplifier 53, By supplying the subtraction amplifier 57 and subtracting the track error signal of the 2nd optical system taken out from the subtraction amplifier 56 here as a signal for direct-current-offset amendment, Since profile offset removal of the signal component according to the aforementioned optic-axis gap and angle gap in the track error signal of the 1st optical system will be carried out by this signal for direct-current-offset amendment, The track error signal of the 1st optical system with which the direct current offset produced by an aforementioned optic-axis gap and angle gap was reduced substantially is acquired from the subtraction amplifier 57.

[0039]Based on the track error signal of this 1st optical system, tracking control of the light spot of the 1st laser beam formed in the recording surface 11a of the optical disk media 10 is performed by the publicly known means. Since the direct current offset produced by an aforementioned optic-axis gap and angle gap is reduced substantially, this track error signal can perform tracking control of the light spot on the recording surface 11a with high precision.

[0040]In this embodiment, multiplex the 1st and 2nd laser beams with the wavelength selection prism 22, and it enters into the object lens 21, The catoptric light from the optical disk media 10 which penetrated the object lens 21 is separating spectrally and entering into the 1st and 2nd photodetectors, Since the 1st optical system 30 and 2nd optical system 40 enable it to share an object lens, the focus on each optical disk media 10 is homotopic mostly on a flat surface, and the tilt of the optical disk media 10 can also perform amendment of very effective direct current offset from an equivalent thing in both focal positions.

[0041]In the method of using the conventional tilt sensor, it is because record or the playback position of the 1st optical system 30, and the measuring point of the angle gap by a tilt sensor had to be detached not less than 10 mm on the mounting and the accuracy of the tilt correction in a recording position was low.

[0042]Since the tilt sensor and lens position sensor which were necessity conventionally can be made unnecessary according to this embodiment, The space which was required for mounting of those sensors can be lost, therefore a miniaturization and weight saving of an optical pickup can be realized, and sensor-parts expense, the conversion cost for adjustment, etc. can be made unnecessary, and can realize cost reduction.

[0043]At the time of record of the optical disk media of a CD standard, or reproduction, only the 2nd optical system 40 is used and the same record as usual and reproduction can be performed. The not a gist but what kind of method of this invention may be sufficient as the detecting method of an RF signal and the detecting method of a focus error signal which are read from the optical disk media 10? Even if applicable optical disk media are limited to neither a CD standard nor a DVD standard and are other standards, it is possible to apply this invention.

[0044]

[Effect of the Invention]As explained above, according to this invention, record or reproduction of information is faced carrying out to record or the reproduction side of optical disk media using the 1st laser beam, The signal according to the optic-axis gap with an object lens, or the relative angle gap with an object lens and optical disk media having made it obtained from the output signal of the 2nd photodetector that receives the

catoptric light from the reflector of the optical disk media of the 2nd laser beam as a track error signal A sake, By amending the track error signal acquired from the output signal of the 1st photodetector that receives the catoptric light from record or the reproduction side of the optical disk media of the 1st laser beam using this track error signal, The direct current offset which originates in an above-mentioned optic-axis gap and angle gap from the track error signal acquired from the output signal of the 1st photodetector can be amended, and highly precise tracking control can be performed.

[0045]According to this invention, the 2nd optical system is provided in record or the object for reproduction of the optical disk media of the 2nd standard from the first, Since the direct current offset which originates in the above-mentioned optic-axis gap and angle gap in a track error signal using this 2nd optical system can be amended, The lens position sensor and tilt sensor which were necessity conventionally can be made unnecessary, therefore the optical pickup only of the part of the required mounting space is [small size, a thin shape, and weight saving] possible, and, thereby, an access speed can also be accelerated conventionally.

[0046]According to this invention, since a lens position sensor and a tilt sensor can be made unnecessary and those parts costs and the conversion cost for adjustment are omissible, cost reduction is realizable.

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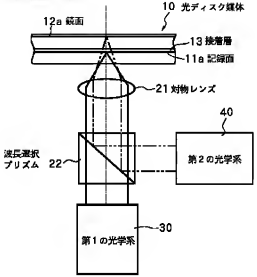
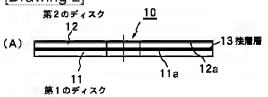
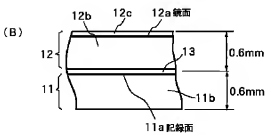
DRAWINGS

[Drawing 1]

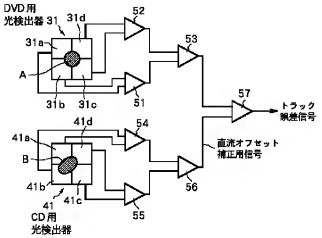


[Drawing 2]

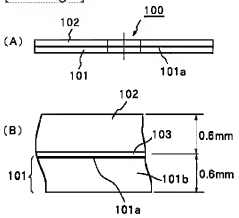




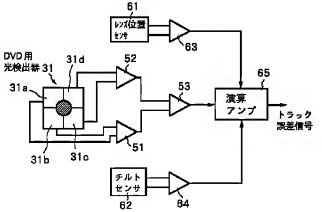
[Drawing 3]



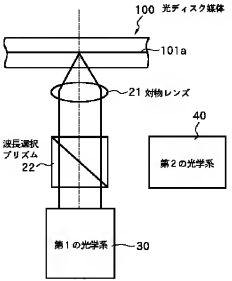
[Drawing 4]



[Drawing 6]



[Drawing 5]



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